

EXHIBIT 50

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
January 2019**

February 8, 2019
CSOMonthly2019-01.docx

January 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				Missing data 01/08 14:00 to 01/08 14:05
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16B	None				
9	7th @ Inland Empire	19	None				
10	3500 High Drive	20	None				
11	Main @ Oak	22B	None				Missing data 01/04 09:20 to 01/04 09:25
12	Cedar @ Summit	23-1	None				Missing data 01/31 10:10 to 01/31 10:30
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

January 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 01/02 09:25 to 01/02 09:30 Missing data 01/24 08:50 to 01/24 08:55 Missing data 01/25 11:40 to 01/25 11:45
17	Riverside @ Lincoln	26	4	Total	3,490,518	1,355	
				01/08	2,061,703	735	
				01/17	1,278,221	320	
				01/19	51,347	105	
				01/23	99,247	195	
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				Missing data 01/05 13:05 to 01/05 13:10 Missing data 01/05 13:50 to 01/05 13:55 Missing data 01/05 15:25 to 01/05 15:30 Missing data 01/27 09:50 to 01/27 09:55 Missing data 01/27 10:25 to 01/27 10:30
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		4		3490518	1355	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

January 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Albi	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	GEG			NWS			SFF	
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain	
01/01/19	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	T	T	-	T	
01/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/03/19	0.05	0.05	0.07	0.03	0.05	0.05	0.03	0.04	0.05	0.07	0.08	0.07	0.04	-	-	0.07	T	-	0.07	
01/04/19	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	-	-	-	-	
01/05/19	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	T	
01/06/19	0.02	0.01	-	0.01	0.01	-	0.01	0.01	0.01	0.01	0.01	0.01	T	0.10	-	0.01	0.10	T	0.03	
01/07/19	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	T	T	-	-	
01/08/19	0.07	0.09	0.05	0.27	0.20	0.31	0.50	0.38	0.26	0.15	0.29	0.09	0.39	0.60	T	0.35	0.50	T	0.35	
01/09/19	0.62	0.49	0.48	0.24	0.53	0.27	0.39	0.28	0.49	0.58	0.31	0.57	0.27	-	T	0.29	-	T	0.29	
01/10/19	0.05	0.09	-	0.01	-	-	-	-	0.01	0.01	0.01	0.03	T	T	-	T	T	-	T	
01/11/19	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/13/19	0.01	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/15/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/17/19	0.28	0.32	0.05	0.17	0.30	0.21	0.33	0.21	0.32	0.33	0.26	0.30	0.30	T	-	0.33	T	-	0.25	
01/18/19	-	-	-	-	-	-	-	-	0.01	-	-	-	0.01	-	-	T	-	-	0.01	
01/19/19	0.16	0.17	0.13	0.09	0.15	0.10	0.19	0.05	0.16	0.13	0.17	0.14	0.16	T	T	0.14	T	-	0.07	
01/20/19	0.08	0.07	0.03	0.04	0.03	-	0.06	0.03	0.03	0.03	0.02	0.02	0.05	T	-	0.02	T	-	0.03	
01/21/19	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
01/22/19	-	0.01	-	0.30	0.07	0.38	0.53	0.30	0.03	-	0.26	-	0.42	3.80	-	0.48	4.50	5.00	0.25	
01/23/19	0.40	0.22P	0.40	0.15	0.47	0.15	0.25P	0.16	0.25	0.36P	0.29	0.32	0.11	0.70	5.00	0.07	0.50	3.00	0.17	
01/24/19	0.05	0.03	0.01	-	-	-	-	0.02	0.01	-	-	-	-	-	2.00	-	-	3.00	-	
01/25/19	0.06	0.04	0.01	-	-	-	-	-	0.13	0.05	-	-	-	-	2.00	-	-	3.00	-	
01/26/19	0.05	0.03	0.01	-	-	-	-	-	0.05	0.02	-	-	-	-	2.00	-	-	3.00	-	
01/27/19	0.03	-	-	-	-	-	-	-	0.04	0.02	-	-	T	-	2.00	-	-	3.00	-	
01/28/19	0.01	-	-	-	-	-	-	-	-	-	-	-	T	T	2.00	-	-	3.00	-	
01/29/19	0.01	0.03	-	-	-	-	-	-	-	0.01	-	-	-	-	2.00	-	-	3.00	-	
01/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.00	-	-	3.00	-	
01/31/19	-	0.01	-	-	-	-	-	-	-	0.05	0.02	-	-	-	-	2.00	M	M	M	-
Total	1.96	1.67P	1.25	1.31	1.81	1.47	2.29E	1.46	1.91	1.8P	1.70	1.55	1.75	5.20	-	1.76	5.60	-	1.52	

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

January 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
February 2019**

March 5, 2019
CSOMonthly2019-02.docx

February 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				Missing data 02/22 14:30 to 02/25 14:20
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16B	None				
9	7th @ Inland Empire	19	None				
10	3500 High Drive	20	None				Missing data 02/10 08:35 to 02/10 08:40 Missing data 02/12 12:35 to 02/23 12:40 Missing data 02/12 12:55 to 02/12 13:00 Missing data 02/12 13:30 to 02/12 13:35 Missing data 02/12 15:50 to 02/12 16:10 Missing data 02/12 16:50 to 02/12 16:55 Missing data 02/12 17:10 to 02/12 17:15
11	Main @ Oak	22B	None				Missing data 02/12 09:00 to 02/12 09:05 Missing data 02/26 13:40 to 02/26 13:45

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

February 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
12	Cedar @ Summit	23-1	None				
15	1st @ Adams	24-1	None				
16	Cedar @ Main	25	None				Missing data 02/12 09:10 to 02/12 09:15 Missing data 02/15 13:05 to 02/15 13:10
17	Riverside @ Lincoln	26	None				
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				Missing data 02/13 09:40 to 02/13 09:45
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		0		0	0	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

February 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Albi	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
02/01/19	0.13	0.01	0.13	0.09	0.13	0.08	0.15	0.08	0.15	0.13	0.13	0.13	0.15	-	2.00	0.12	-	2.00	0.12
02/02/19	0.01	0.03	0.01	-	-	0.01	0.02	-	0.01	0.01	-	0.01	T	-	-	0.01	-	-	0.01
02/03/19	0.07	0.06	0.08	0.02	0.04	0.04	0.03	0.03	0.05	0.07	0.07	0.06	T	-	-	0.06	T	-	0.06
02/04/19	0.01	0.01	-	-	-	-	-	-	-	-	-	T	T	-	-	-	-	-	T
02/05/19	-	-	-	0.03	-	0.01	0.03	0.03	-	-	0.01	-	0.04	0.80	1.00	0.04	1.00	1.00	0.04
02/06/19	-	-	-	-	-	-	-	-	-	-	-	T	T	1.00	-	-	T	T	
02/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	T	-
02/08/19	-	-	-	0.06	-	0.08	0.07	0.05	-	-	0.05	-	0.21	3.90	4.00	0.19	5.80	5.00	0.10
02/09/19	-	-	-	0.02	-	0.04	0.03	0.01	-	-	0.02	-	0.06	0.80	5.00	0.09	0.70	3.00	0.01
02/10/19	-	-	-	-	0.06	0.08	0.03	-	-	0.02	-	0.18	4.00	5.00	0.17	3.50	6.00	0.06	
02/11/19	-	-	-	0.09	-	0.26	0.38	0.28	-	-	0.16	-	0.57	7.20	13.00	0.33	6.00	8.00	0.48
02/12/19	0.02	0.03	0.06	0.31	0.11	0.29	0.51	0.35	0.02	0.01	0.30	0.04	0.12	2.00	17.00	0.13	2.10	11.00	0.14
02/13/19	0.01	0.01	0.09	0.06	0.25	0.02	0.09	0.03	0.01	0.04	0.02	0.20	0.08	0.80	19.00	T	0.20	9.00	0.07
02/14/19	-	-	-	0.08	0.04	0.16	0.15	0.10	0.07	0.01	0.14	0.02	0.20	1.50	17.00	0.26	1.90	10.00	0.13
02/15/19	-	-	0.04	0.11	0.18	0.12	0.15	0.11	0.20	0.05	0.13	0.03	0.19	2.00	17.00	M	1.40	10.00	0.14
02/16/19	-	-	0.04	0.06	0.08	-	0.06	0.03	0.16	0.03	-	0.01	0.02	0.60	15.00	T	T	10.00	0.03
02/17/19	-	-	0.01	0.01	0.02	0.01	0.01	0.04	-	0.05	-	0.04	0.80	15.00	0.05	1.00	10.00	0.03	
02/18/19	-	-	-	-	-	-	-	-	-	-	-	-	-	14.00	-	-	10.00	-	
02/19/19	-	-	-	-	-	-	-	-	-	-	-	-	0.05	0.60	15.00	0.03	0.80	9.00	0.02
02/20/19	-	-	0.01	0.01	0.02	-	0.02	-	0.03	0.01	-	0.01	0.03	0.80	15.00	0.01	0.30	10.00	0.01
02/21/19	-	0.01	-	-	0.01	-	-	-	0.02	-	-	0.06	T	T	15.00	-	-	-	
02/22/19	-	-	-	0.04	-	0.06	0.07	0.05	-	-	0.04	-	0.09	1.10	15.00	0.07	1.30	10.00	0.08
02/23/19	-	-	0.01	-	0.04	-	-	-	0.04	-	-	0.02	T	T	16.00	-	-	10.00	
02/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.00	-	-	9.00	
02/25/19	-	-	-	-	-	-	-	-	-	-	-	0.01	T	T	15.00	-	-	8.00	
02/26/19	-	-	-	-	-	-	-	-	-	-	-	T	T	14.00	-	-	7.00		
02/27/19	-	-	-	0.01	-	0.07	0.16	0.09	0.01	-	0.07	-	0.16	1.60	14.00	0.14	1.40	8.00	0.10
02/28/19	-	-	-	0.08	0.04	0.09	0.10	0.11	0.01	-	0.06	-	0.15	1.40	17.00	0.16	2.00	9.00	0.13
Total	0.25	0.16	0.47	1.08	0.95	1.41	2.11E	1.39	0.82	0.37	1.27	0.60	2.40	29.90		1.86	29.40		1.76

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

Table 3 – Rain Gauges

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

February 2019

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
March 2019**

April 5, 2019
CSOMonthly2019-03.docx

March 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16B	None				Missing data 03/25 12:50 to 03/25 12:55
9	7th @ Inland Empire	19	None				
10	3500 High Drive	20	None				Missing data 03/09 15:35 to 03/09 15:40 Missing data 03/11 11:05 to 03/11 11:10
11	Main @ Oak	22B	None				Missing data 03/11 08:10 to 03/11 08:15 Missing data 03/18 07:05 to 03/18 08:05

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

March 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
12	Cedar @ Summit	23-1	None				Missing data 03/01 09:20 to 03/01 09:25 Missing data 03/07 10:25 to 03/07 10:50 Missing data 03/07 13:45 to 03/07 14:00 Missing data 03/07 14:10 to 03/07 14:15 Missing data 03/08 13:15 to 03/08 13:20 Missing data 03/08 13:45 to 03/08 13:50 Missing data 03/12 07:50 to 03/12 08:45 Missing data 03/13 12:20 to 03/13 12:25 Missing data 03/15 07:40 to 03/15 07:45 Missing data 03/15 08:35 to 03/15 08:40 Missing data 03/15 11:45 to 03/15 11:50 Missing data 03/18 12:35 to 03/18 13:30 Missing data 03/19 13:15 to 03/19 13:20 Missing data 03/25 02:05 to 03/25 02:10
15	1st @ Adams	24-1	None				
16	Cedar @ Main	25	None				Missing data 03/12 12:25 to 03/12 12:30 Missing data 03/28 09:35 to 03/28 09:40
17	Riverside @ Lincoln	26	2	Total	1,184,100	280	
				03/12	237,350	185	
				03/31	946,750	95	
19	Arthur @ 3rd	33C	1	Total	1,103	10	
				03/31	1,103	10	
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		3		1185203	290	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

March 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Albi	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
03/01/19	-	-	0.01	0.01	0.04	-	-	-	0.05	-	-	0.08	-	-	16.00	-	-	8.00	-
03/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.00	-	-	8.00	-
03/03/19	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	14.00	-	-	8.00	-
03/04/19	-	-	-	-	-	-	-	-	-	0.01	-	-	-	-	14.00	-	-	8.00	-
03/05/19	-	0.01	-	-	-	-	-	-	0.04	-	-	0.12	-	-	14.00	-	-	8.00	-
03/06/19	0.02	0.18	0.10	0.04	0.09	0.05	0.08	0.05	0.34	0.38	0.07	0.15	0.09	0.40	14.00	0.10	0.30	7.00	0.06
03/07/19	-	0.01	-	0.01	0.01	-	0.01	-	0.11	0.10	-	0.01	0.01	0.20	14.00	T	T	6.00	0.02
03/08/19	-	-	-	-	-	-	-	-	0.05	0.03	0.05	-	-	-	14.00	T	T	6.00	-
03/09/19	0.03	0.03	-	0.01	-	-	-	-	0.06	0.02	-	-	-	-	12.00	-	-	6.00	-
03/10/19	0.02	0.02	-	-	-	-	-	-	0.05	-	-	-	-	-	12.00	-	-	6.00	-
03/11/19	-	0.05	-	-	-	-	-	-	0.01	-	-	-	-	-	12.00	-	-	6.00	-
03/12/19	-	0.04	0.20	0.36	0.33	0.28	0.56	0.32	0.18	0.30	0.31	0.27	0.38	3.20	13.00	0.30	3.50	8.00	0.43
03/13/19	0.01	0.12	0.04	0.04	0.12	0.02	0.03	0.02	0.31	0.11	-	0.07	T	T	16.00	T	T	7.00	0.04
03/14/19	0.01	0.19	-	-	-	-	-	-	-	-	-	-	-	-	15.00	-	-	7.00	-
03/15/19	0.01	0.15	-	-	-	-	-	-	-	-	-	-	-	-	14.00	-	-	7.00	-
03/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.00	-	-	-	-
03/17/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.00	-	-	5.00	-
03/18/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.00	-	-	4.00	-
03/19/19	-	-	-	-	-	P	-	-	-	-	-	-	-	-	8.00	-	-	3.00	-
03/20/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.00	-	-	3.00	-
03/21/19	-	-	-	-	-	P	-	-	-	-	-	-	-	-	2.00	-	-	3.00	-
03/22/19	-	-	-	-	-	P	-	-	-	-	-	-	-	-	1.00	-	-	1.00	-
03/23/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-
03/24/19	0.01	0.02	0.01	-	-	0.01	0.01	-	0.01	-	0.01	0.01	0.04	-	-	0.03	-	-	0.01
03/25/19	0.01	-	0.02	-	0.01	0.02	-	-	0.02	0.02	0.02	-	0.01	-	-	0.01	-	-	T
03/26/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/19	-	-	-	-	-	-	-	-	-	-	-	-	T	M	-	T	-	-	T
03/28/19	0.09	0.08	0.07	0.07	0.10	0.05	0.14	0.05	0.13	0.09	0.02	0.02	0.14	-	-	0.14	-	-	0.04
03/29/19	0.01	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.01	-	-	-
03/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/19	0.08	0.04	-	0.10	0.21	0.02	0.28	0.01	0.11	0.07	-	-	0.04	-	-	0.02	-	-	0.04
Total	0.30	0.94	0.46	0.64	0.91	0.45P	1.11E	0.45	1.47	1.13	0.48	0.73	0.71	3.80	-	0.61	3.80	-	0.64

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

March 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
April 2019**

May 15, 2019
CSOMonthly2019-04.docx

April 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				Missing data 04/25 13:25 to 04/25 13:30
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16B	None				
9	7th @ Inland Empire	19	None				Missing data 04/22 08:50 to 04/22 08:55
10	3500 High Drive	20	None				Missing data 04/22 08:25 to 04/22 08:30
11	Main @ Oak	22B	1	Total	7,746	10	Missing data 04/22 08:40 to 04/22 09:20 Missing data 04/22 09:25 to 04/22 13:20 Missing data 04/26 10:45 to 04/26 10:50
				04/09	7,746	10	
12	Cedar @ Summit	23-1	None				Missing data 04/08 12:35 to 04/08 12:40
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

April 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 04/05 09:45 to 04/05 09:50 Missing data 04/11 09:15 to 04/11 09:20 Missing data 04/12 08:40 to 04/12 08:45 Missing data 04/24 14:20 to 04/24 14:25
17	Riverside @ Lincoln	26	3	Total	4,138,395	1,115	
				04/03	84,026	80	
				04/05	3,043,739	795	
				04/12	1,010,630	240	
19	Arthur @ 3rd	33C	None				Missing data 04/11 07:45 to 04/11 07:50
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				Missing data 04/03 12:55 to 04/03 13:05
22	Riverside @ Napa/Crestline	34	1	Total	1,689	25	Missing data 04/26 09:05 to 04/26 09:10
				04/09	1,689	25	
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		5		4147830	1150	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

April 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
04/01/19	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/19	0.30	0.25	0.02	0.18	0.02	0.01	0.24	0.09	0.04	0.01	0.02	0.02	0.05	-	-	0.03	-	-	0.09
04/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/05/19	0.16	0.23	0.25	0.17	0.20	0.27	0.28	0.13	0.28	0.24	0.25	0.14	0.22	-	-	0.28	-	-	0.10
04/06/19	0.09	0.07	0.06	P	0.07	0.05	0.12	0.05	0.07	0.05	0.06	0.05	0.06	-	-	0.06	-	-	0.07
04/07/19	0.20	0.21	0.22	M	0.22	0.23	0.29	0.14	0.24	0.21	0.25	0.25	0.23	-	-	0.27	-	-	0.23
04/08/19	0.09	0.09	0.09	M	0.05	0.07	0.14	0.11	0.05	0.05	0.08	0.17	0.11	-	-	0.08	-	-	0.11
04/09/19	0.51	0.49	0.40	M	0.37	0.48	0.57	0.37	0.46	0.37	0.33	0.48	0.49	-	-	0.43	-	-	0.40
04/10/19	-	0.01	-	M	-	-	-	-	-	-	0.01	-	T	-	-	-	-	-	-
04/11/19	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-
04/12/19	0.03	-	0.14	M	0.04	0.17	0.04	0.03	-	0.04	0.03	0.02	0.01	-	-	0.05	-	-	0.03
04/13/19	0.27	0.22	0.21	M	0.22	0.26	0.23	0.20	0.25	0.21	0.25	0.23	0.19	-	-	0.32	-	-	0.20
04/14/19	-	-	-	M	-	-	-	-	-	-	0.01	-	T	-	-	0.02	-	-	-
04/15/19	0.05	0.02	-	M	-	-	0.09	-	-	-	-	-	0.01	-	-	0.02	T	-	0.02
04/16/19	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/17/19	-	-	-	M	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
04/18/19	-	-	-	M	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
04/19/19	-	-	-	M	0.01	-	-	-	-	-	-	-	T	-	-	0.01	-	-	T
04/20/19	-	0.02	-	M	-	0.01	-	-	0.01	0.01	-	-	0.03	-	-	0.04	-	-	T
04/21/19	0.01	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/22/19	-	-	-	M	0.01	-	-	0.01	0.01	-	0.01	-	T	-	-	0.01	-	-	0.01
04/23/19	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	-
04/24/19	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/26/19	0.14	0.15	0.05	0.11	0.07	0.04	0.16	0.10	0.07	0.05	0.07	0.07	0.07	-	-	0.02	-	-	0.11
04/27/19	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	T
04/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.86	1.76	1.44	0.46M	1.28	1.59	2.16E	1.23	1.48	1.24	1.37	1.43	1.47	0.00	-	1.65	0.00	-	1.37

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

April 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
May 2019**

June 7, 2019
CSOMonthly2019-05.docx

May 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	1	Total	1,989,917	840	
				05/16	1,989,917	840	
3	Columbia @ Downriver	7	1	Total	74,368	55	
				05/16	74,368	55	
4	Nettleton @ York/Buckeye	10	None				Missing data 05/17 00:50 to 05/17 00:55 Missing data 05/17 01:30 to 05/17 01:35 Missing data 05/17 02:35 to 05/17 02:55 Missing data 05/17 03:15 to 05/17 03:20 Missing data 05/17 03:35 to 05/17 03:40 Missing data 05/17 04:00 to 05/17 04:10 Missing data 05/17 04:25 to 05/17 04:30 Missing data 05/17 04:35 to 05/17 04:40 Missing data 05/17 04:45 to 05/17 04:55 Missing data 05/17 05:20 to 05/17 05:25 Missing data 05/17 06:40 to 05/17 06:45
5	Nora @ Pettet	12	1	Total	1,722,421	1,085	
				05/16	1,722,421	1,085	
6	Sherwood @ Summit	14	1	Total	16,550	20	Missing data 05/13 08:55 to 05/13 09:00 Missing data 05/19 20:00 to 05/19 20:05
				05/16	16,550	20	
7	Nettleton @ Ohio	15	None				Missing data 05/13 09:50 to 05/13 09:55

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

May 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
8	A @ Linton	16B	None				Missing data 05/13 12:55 to 05/13 13:05
9	7th @ Inland Empire	19	1	Total	17,344	15	
				05/16	17,344	15	
10	3500 High Drive	20	None				
11	Main @ Oak	22B	1	Total	524,223	35	Missing data 05/09 08:40 to 05/09 08:45 Missing data 05/18 20:00 to 05/18 20:05 Missing data 05/18 22:00 to 05/18 22:05 Missing data 05/19 02:00 to 05/19 02:05 Missing data 05/19 04:00 to 05/19 04:05 Missing data 05/19 06:00 to 05/19 06:05 Missing data 05/19 08:00 to 05/19 08:05 Missing data 05/19 10:00 to 05/19 10:05 Missing data 05/19 12:00 to 05/19 12:05 Missing data 05/19 14:00 to 05/19 14:05 Missing data 05/19 16:00 to 05/19 16:05 Missing data 05/19 18:00 to 05/19 18:05 Missing data 05/19 20:00 to 05/19 20:05 Missing data 05/19 22:00 to 05/19 22:05 Missing data 05/20 02:00 to 05/20 02:05
				05/16	524,223	35	
12	Cedar @ Summit	23-1	1	Total	31,395	40	Missing data 05/03 12:40 to 05/03 12:45 Missing data 05/16 07:55 to 05/16 08:00
				05/16	31,395	40	
15	1st @ Adams	24-1	1	Total	5,243,278	1,030	
				05/16	5,243,278	1,030	
16	Cedar @ Main	25	1	Total	61,746	50	Missing data 05/17 18:40 to 05/17 18:45 Missing data 05/17 22:30 to 05/17 22:35
				05/16	61,746	50	
17	Riverside @ Lincoln	26	3	Total	6,829,887	1,115	Missing data 05/24 13:00 to 05/24 13:15 Missing data 05/29 00:00 to 05/29 00:05
				05/16	6,688,830	1,075	Volume estimated due to vault surcharge
				05/24	128,952	20	
				05/26	12,105	20	
19	Arthur @ 3rd	33C	1	Total	1,691	70	
				05/16	1,691	70	
20	Liberty Park (west end)	33-1	1	Total	925,841	330	Missing data 05/17 21:05 to 05/17 21:10 Missing data 05/17 21:35 to 05/17 21:40 Missing data 05/18 11:55 to 05/18 12:00
				05/17	925,841	330	

May 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	1	Total	15,148	30	Missing data 05/07 07:55 to 05/07 08:00
				05/16	15,148	30	
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	1	Total	80,680	55	
				05/16	80,680	55	
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		16		17,534,489	4,770	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

May 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
05/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/05/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/06/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-
05/07/19	-	-	-	-	0.01	-	-	-	-	-	-	-	-	0.04	-	-	0.09	-	-	-
05/08/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/09/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/10/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/11/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/13/19	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.02	-	-	T
05/15/19	-	0.01	0.01	-	0.01	0.02	-	0.02	0.05	0.02	0.01	0.01	0.02	0.03	-	-	0.01	-	-	T
05/16/19	1.00	0.74	1.12	1.21	1.30	0.84	1.59	1.30	1.39	1.25	1.27	0.94	1.22	0.27	-	-	0.23	-	-	0.83
05/17/19	1.57	1.19	1.31	1.41	1.32	1.27	2.10	1.39	1.14	1.39	0.98	0.94	0.67	0.80	-	-	0.84	-	-	1.22
05/18/19	0.07	0.04	0.03	0.05	0.04	0.04	0.06	0.06	0.03	0.03	0.07	0.08	0.04	0.03	-	-	0.01	-	-	0.15
05/19/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
05/20/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/21/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/22/19	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
05/23/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/24/19	0.03	-	0.19	0.03	0.23	0.37	0.03	0.45	0.05	0.10	0.75	0.20	0.19	T	-	-	0.06	-	-	0.55
05/25/19	0.05	0.05	0.04	0.09	0.06	0.03	0.10	0.06	0.05	0.08	0.04	0.02	0.04	0.04	-	-	0.06	-	-	0.05
05/26/19	0.14	0.12	0.09	0.11	0.11	0.09	0.18	0.10	0.11	0.10	0.07	0.10	0.07	0.11	-	-	0.15	-	-	0.08
05/27/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	-	T	-	-	-
05/31/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.86	2.15	2.79	2.90	3.09	2.66	4.06E	3.38P	2.82	2.97	3.19	2.29	2.25	1.35	0.00	-	1.47	0.00	-	2.88

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

May 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
June 2019**

July 16, 2019
CSOMonthly2019-06.docx

June 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				Missing data 06/03 08:50 to 06/03 09:00
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16B	None				Missing data 06/19 08:10 to 06/19 08:30
9	7th @ Inland Empire	19	None				
10	3500 High Drive	20	None				Outfall Plugged on 4/19/2019; Outfall will be removed from the July 2019 report
11	Main @ Oak	22B	None				
12	Cedar @ Summit	23-1	None				
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

June 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 06/03 08:35 to 06/03 08:40 Missing data 06/10 12:55 to 06/10 13:00 Missing data 06/12 12:30 to 06/12 12:35 Missing data 06/19 09:05 to 06/19 09:10 Missing data 06/26 08:25 to 06/26 08:30
17	Riverside @ Lincoln	26	2	Total	213,282	60	Missing data 06/10 08:45 to 06/10 08:50 Missing data 06/26 08:45 to 06/26 08:50
				06/05	5,269	30	
				06/19	208,013	30	
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		2		213,282	60	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

June 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
06/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/05/19	0.18	0.19	0.13	0.19	0.26	0.10	0.28	0.23	0.28	0.21	0.15	0.17	0.14	0.20	-	-	0.08	-	-	0.19
06/06/19	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-	-	-
06/07/19	-	-	-	0.08	0.02	-	0.11	0.04	0.03	0.03	0.01	-	-	T	-	-	0.01	-	-	0.09
06/08/19	0.04	0.06	0.02	0.02	0.02	0.01	0.05	0.08	0.06	-	0.11	0.11	0.07	0.03	-	-	0.01	-	-	0.08
06/09/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/10/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/11/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/13/19	-	-	-	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/15/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/17/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/18/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/19/19	0.08	0.08	0.02	0.14	0.26	0.05	0.19	0.27	0.17	0.14	0.07	0.09	0.08	0.08	-	-	0.02	-	-	0.40
06/20/19	0.01	0.05	0.05	0.01	0.01	0.01	0.02	-	0.07	0.03	-	-	-	0.01	-	-	0.01	-	-	0.01
06/21/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/22/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/23/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/26/19	0.10	0.06	0.04	0.10	0.04	0.03	0.10	0.10	0.05	0.03	0.05	0.04	0.05	0.03	-	-	0.04	-	-	0.15
06/27/19	0.11	0.05	0.11	0.08	0.09	0.04	0.08	0.12	0.03	0.06	0.07	0.15	0.06	0.09	-	-	0.04	-	-	0.09
06/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.52	0.49	0.37	0.62	0.72	0.24	0.83E	0.84	0.69	0.50	0.46	0.56	0.42	0.44	0.00	-	0.21	0.00	-	1.01

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

June 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
July 2019**

August 7, 2019
CSOMonthly2019-07.docx

July 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				Missing data 07/08 08:55 to 07/08 09:00 Missing data 07/12 08:55 to 07/12 09:05 Missing data 07/19 08:30 to 07/19 08:35 Missing data 07/19 09:15 to 07/19 09:20 Missing data 07/22 12:50 to 07/22 13:05 Missing data 07/22 13:40 to 07/22 13:45
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				Missing data 07/16 13:25 to 07/16 13:30
9	7th @ Inland Empire	19	None				
11	Main @ Oak	22B	None				Missing data 07/15 08:20 to 07/15 08:25
12	Cedar @ Summit	23-1	None				Missing data 07/02 07:50 to 07/02 07:55 Missing data 07/02 08:10 to 07/02 09:10
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

July 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 07/19 12:55 to 07/19 13:00 Missing data 07/29 09:50 to 07/29 09:55
17	Riverside @ Lincoln	26	2	Total	612,517	120	Missing data 07/17 07:45 to 07/17 08:15 Missing data 07/25 13:10 to 07/25 13:15 Missing data 07/29 10:10 to 07/29 10:15
				07/16	501,798	70	
				07/23	110,719	50	
19	Arthur @ 3rd	33C	2	Total	2,429	70	Missing data 07/02 18:00 to 07/02 18:05
				07/16	1,837	55	
				07/23	592	15	
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	1	Total	36,235	45	Missing data 07/12 09:25 to 07/12 09:30 Missing data 07/25 08:40 to 07/25 08:45
				07/16	36,235	45	
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		5		651,181	235	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

July 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
07/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-
07/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
07/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/05/19	-	-	-	-	-	0.01	-	-	0.01	-	-	-	-	T	-	-	0.07	-	-	-
07/06/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-
07/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
07/08/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/09/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
07/10/19	-	-	0.01	-	-	-	-	-	-	-	-	-	-	T	-	-	0.02	-	-	T
07/11/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
07/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/13/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.01	-	-	-
07/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/15/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.02	-	-	T
07/16/19	0.47	0.30	0.08	0.47	0.19	0.10	0.78	0.18	0.28	0.29	0.15	0.13	0.12	0.29	-	-	0.07	-	-	0.15
07/17/19	0.02	0.01	-	0.01	-	-	0.02	0.01	0.01	-	-	-	-	T	-	-	0.01	-	-	T
07/18/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/19/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/20/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/21/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/22/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-
07/23/19	0.10	0.13	0.11	0.14	0.09	0.15	0.13	0.15	0.15	0.14	0.08	0.08	0.09	0.12	-	-	0.13	-	-	0.11
07/24/19	0.17	0.13	0.13	0.15	0.18	0.14	0.21	0.17	0.14	0.14	0.18	0.16	0.12	0.11	-	-	0.09	-	-	0.18
07/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/26/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/27/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/30/19	-	-	-	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07/31/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.76	0.57	0.33	0.77	0.50	0.40	1.14E	0.51	0.59	0.57	0.41	0.37	0.33	0.52	0.00	-	0.42	0.00	-	0.44

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

July 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
August 2019**

September 5, 2019
CSOMonthly2019-08.docx

August 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				
9	7th @ Inland Empire	19	None				
11	Main @ Oak	22B	None				
12	Cedar @ Summit	23-1	None				Missing data 08/09 08:35 to 08/09 08:40 Missing data 08/13 12:05 to 08/13 12:10 Missing data 08/21 08:50 to 08/21 08:55 Missing data 08/21 12:50 to 08/21 13:00 Missing data 08/26 02:35 to 08/26 02:40
15	1st @ Adams	24-1	None				
16	Cedar @ Main	25	None				Missing data 08/26 09:50 to 08/26 09:55

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

August 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
17	Riverside @ Lincoln	26	1	Total	623,700	80	Missing data 08/21 06:50 to 08/21 06:55
				08/11	623,700	80	
19	Arthur @ 3rd	33C	1	Total	818	15	
				08/11	818	15	
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				Missing data 08/13 08:55 to 08/13 09:00 Missing data 08/19 08:30 to 08/19 09:35 Missing data 08/19 09:40 to 08/19 11:45 Missing data 08/28 17:40 to 08/28 17:45
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				Missing data 08/27 06:45 to 08/27 07:10
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		2		624,518	95	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

August 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
08/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/02/19	0.02	-	-	0.01	0.01	-	-	-	-	-	-	-	-	T	-	-	-	-	-	0.02
08/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/05/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/06/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/08/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/09/19	0.09	0.14	0.14	0.09	0.10	0.16	0.20	0.34	0.23	0.11	0.04	0.03	0.12	0.10	-	-	0.11	-	-	0.20
08/10/19	-	-	0.07	-	-	0.05	-	-	0.01	0.36	-	0.11	T	-	-	0.08	-	-	T	-
08/11/19	0.26	0.46	0.26	0.33	0.42	0.25	0.43	0.24	0.62	0.44	0.19	0.13	0.14	0.36	-	-	0.38	-	-	0.23
08/12/19	0.01	-	-	0.01	-	0.01	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-
08/13/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/15/19	-	-	-	-	-	0.04	-	-	-	-	-	-	-	-	-	-	T	-	-	-
08/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/17/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-
08/18/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/19/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/20/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/21/19	0.04	0.01	-	0.02	-	-	-	0.03	-	-	0.01	0.02	-	T	-	-	0.01	-	-	0.04
08/22/19	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	T	-	-	T	-	-	0.02
08/23/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/26/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/27/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-
08/30/19	0.03	0.01	-	0.03	0.01	0.01	0.06	0.05	0.01	0.04	0.01	-	-	0.02	-	-	0.02	-	-	0.01
08/31/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.45	0.62	0.47	0.49	0.58	0.48	0.69E	0.67	0.86	0.60	0.62	0.19	0.37	0.48	0.00	-	0.60	0.00	-	0.52

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

August 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
September 2019**

**October 11, 2019
(Revised November 8, 2019)
CSOMonthly2019-09_revised.docx**

September 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				Missing data 09/17 00:00 to 09/17 10:15
3	Columbia @ Downriver	7	1	Total	85,993	40	Missing data 09/06 12:20 to 09/06 12:25
				09/09	85,993	40	
4	Nettleton @ York/Buckeye	10	None				Missing data 09/06 11:50 to 09/06 12:15 Missing data 09/26 08:30 to 09/26 08:40
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				
9	7th @ Inland Empire	19	None				
11	Main @ Oak	22B	None				Missing data 09/26 07:05 to 09/26 07:10
12	Cedar @ Summit	23-1	None				Missing data 09/11 09:15 to 09/11 09:20 Missing data 09/22 06:55 to 09/22 23:55 Missing data 09/23 06:45 to 09/23 06:50
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

September 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 09/16 12:20 to 09/16 12:25 Missing data 09/25 13:40 to 09/25 13:45
17	Riverside @ Lincoln	26	2	Total	716,583	290	Missing data 09/19 12:45 to 09/19 12:50
				09/08	214,515	85	
				09/28	502,068	205	
19	Arthur @ 3rd	33C	None				Missing data 09/14 20:00 to 09/14 20:05 Missing data 09/19 19:00 to 09/19 19:05
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				Missing data 09/06 16:15 to 09/06 16:20 Missing data 09/07 08:20 to 09/07 08:25
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				Missing data 09/04 09:25 to 09/04 09:30
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		3		802,576	330	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

September 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Albi	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
09/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/05/19	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/06/19	0.06	0.06	0.07	0.06	0.07	0.07	0.09	0.08	0.07	0.05	0.06	0.06	0.06	0.04	-	-	0.07	-	-	0.10
09/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/08/19	0.14	0.14	0.15	0.33	0.14	0.15	0.29	0.39	0.12	0.14	0.21	0.34	0.16	0.09	-	-	0.14	-	-	0.41
09/09/19	0.23	0.27	0.62	0.25	0.31	0.57	0.41	0.31	0.54	0.67	0.47	0.40	0.38	0.64	-	-	0.67	-	-	0.21
09/10/19	0.01	0.01	0.01	0.01	-	0.01	-	-	-	-	0.01	0.01	-	T	-	-	0.01	-	-	-
09/11/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.04	-	-	-
09/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/13/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
09/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/15/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/16/19	0.01	0.04	0.05	0.01	0.04	0.06	0.04	0.02	0.05	0.05	0.03	0.02	0.02	0.08	-	-	0.12	-	-	T
09/17/19	-	0.01	0.02	-	-	-	-	-	-	-	-	-	-	T	-	-	0.03	-	-	T
09/18/19	0.06	0.02	-	0.05	0.02	0.13	0.03	0.04	0.03	0.01	0.05	0.03	0.02	0.09	-	-	0.34	-	-	0.03
09/19/19	0.01	-	-	-	-	0.01	-	-	-	0.01	0.01	-	-	T	-	-	0.01	-	-	-
09/20/19	0.02	0.02	-	0.03	0.01	0.03	0.05	0.03	0.01	0.01	0.05	0.01	0.03	0.01	-	-	0.02	-	-	0.01
09/21/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/22/19	-	-	-	-	-	-	0.01	0.01	-	-	-	0.01	-	T	-	-	-	-	-	0.01
09/23/19	-	0.01	-	-	-	0.02	-	0.01	0.02	0.01	0.02	0.01	-	0.02	-	-	0.03	-	-	0.01
09/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
09/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09/26/19	0.02	0.02	-	-	-	-	-	-	-	-	-	0.01	-	0.04	-	-	-	-	-	0.01
09/27/19	0.04	0.05	-	0.06	0.03	0.14	0.08	0.06	0.04	0.05	0.18	0.07	0.07	0.03	-	-	0.20	-	-	0.05
09/28/19	0.74	0.72	-	0.54	0.59	0.50	0.88	0.45	0.63	0.60	0.56	0.55	0.26	0.72	1.90	-	0.73	1.50	1.00	0.66
09/29/19	0.12	0.36	-	0.01	0.09	0.08	0.07	-	0.19	0.11	0.03	0.03	0.02	0.22	1.40	3.00	0.22	1.60	-	0.09
09/30/19	-	0.09	-	-	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-
Total	1.46	1.88	0.92P	1.35	1.30	1.77	1.95E	1.40	1.70	1.71	1.68	1.56	1.02	1.98	3.30	-	2.60	3.10	-	1.59

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

September 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Alb	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
October 2019**

November 11, 2019
CSOMonthly2019-10.docx

October 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				Missing data 10/14 07:30 to 10/14 07:35
2	NW Blvd @ Kiernan	6	None				Missing data 10/28 07:30 to 10/28 07:35
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				Missing data 10/15 14:55 to 10/15 15:00
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				
9	7th @ Inland Empire	19	None				Missing data 10/14 08:25 to 10/14 08:30 Missing data 10/23 06:55 to 10/23 07:00 Missing data 10/23 07:05 to 10/23 07:10 Missing data 10/23 07:20 to 10/23 07:25 Missing data 10/23 13:20 to 10/23 14:30
11	Main @ Oak	22B	None				
12	Cedar @ Summit	23-1	None				Missing data 10/06 22:15 to 10/06 23:40
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

October 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 10/18 12:45 to 10/18 12:50 Missing data 10/28 07:55 to 10/28 08:00
17	Riverside @ Lincoln	26	2	Total	538,428	190	
				10/08	484,243	125	
				10/21	54,185	65	
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				Missing data 10/14 09:45 to 10/14 09:50
22	Riverside @ Napa/Crestline	34	1	Total	93,846	105	Missing data 10/07 11:45 to 10/07 11:50
				10/09	93,846	105	
23	S. Riverton @ Magnolia	38-1	None				Missing data 10/14 10:05 to 10/14 10:10
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				Missing data 10/24 13:30 to 10/24 13:35
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		3		632,274	295	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

October 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
10/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	T	-	-	T
10/04/19	0.02	0.01	-	0.06	0.03	0.02	0.07	0.01	0.03	0.01	0.22	0.02	-	T	-	-	T	-	-	0.01
10/05/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	T
10/06/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-
10/08/19	0.34	0.49	-	0.71	0.30	0.56	0.81	0.57	0.33	0.20	0.32	0.25	0.11	0.64	3.30	-	0.32	1.50	1.00	0.52
10/09/19	0.29	0.27	-	0.25	0.29	-	0.30	0.25	0.28	0.29	0.12	0.28	0.14	0.01	0.30	4.00	T	T	-	0.09
10/10/19	0.21	0.15	-	-	-	-	0.14	-	0.12	0.01	-	0.09	0.03	-	-	1.00	-	-	-	-
10/11/19	0.01	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/12/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/13/19	0.02	0.03	-	0.02	0.01	-	0.01	0.02	0.01	-	-	-	-	T	-	-	T	-	-	T
10/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/15/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	0.01	-	-	T
10/17/19	0.01	0.02	-	-	0.01	0.03	0.02	0.01	0.01	0.03	0.02	0.01	-	0.01	-	-	0.02	-	-	0.02
10/18/19	0.05	0.06	-	0.05	0.03	0.05	0.07	0.04	0.05	0.03	0.04	0.02	0.03	0.05	-	-	0.09	-	-	0.04
10/19/19	0.27	0.28	-	0.24	0.30	0.49	0.41	0.27	0.38	0.30	0.50	0.40	0.16	0.32	-	-	0.32	-	-	0.24
10/20/19	0.13	0.12	-	0.11	0.13	0.11	0.15	0.11	0.14	0.13	0.16	0.16	0.07	0.11	-	-	0.11	-	-	0.15
10/21/19	0.29	0.33	-	0.34	0.29	0.34	0.51	0.32	0.35	0.34	0.40	0.29	0.23	0.29	-	-	0.37	-	-	0.37
10/22/19	0.14	0.05	-	0.08	0.06	0.06	0.13	0.10	0.04	0.05	0.08	0.15	0.08	0.03	-	-	0.02	-	-	0.11
10/23/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-
10/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/26/19	0.04	0.05	-	0.04	0.04	0.03	0.06	0.04	0.04	0.04	0.05	0.07	0.03	0.06	T	-	0.03	T	-	0.06
10/27/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/28/19	-	-	-	-	-	-	-	-	-	-	0.01	-	-	T	T	-	T	T	-	T
10/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/31/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.82	2.04	0M	1.90	1.49	1.69	2.68E	1.74	1.78	1.43	1.92	1.74	0.88	1.53	3.60	-	1.29	1.50	-	1.61

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

October 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
November 2019**

December 6, 2019
CSOMonthly2019-11.docx

November 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				Missing data 11/21 14:05 to 11/21 14:10
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				
9	7th @ Inland Empire	19	None				Missing data 11/21 13:20 to 11/21 13:25
11	Main @ Oak	22B	None				Missing data 11/05 10:50 to 11/05 10:55 Missing data 11/06 08:20 to 11/06 08:25 Missing data 11/15 09:10 to 11/15 09:15
12	Cedar @ Summit	23-1	None				Missing data 11/20 08:45 to 11/20 08:50 Missing data 11/20 14:15 to 11/20 14:20 Missing data 11/22 13:40 to 11/22 13:45 Missing data 11/27 12:10 to 11/27 12:15
15	1st @ Adams	24-1	None				

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

November 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
16	Cedar @ Main	25	None				Missing data 11/15 09:05 to 11/15 09:10 Missing data 11/26 10:30 to 11/26 10:35
17	Riverside @ Lincoln	26	1	Total 11/17	378,272 378,272	100 100	Missing data 11/25 09:55 to 11/25 10:00
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				Missing data 11/15 09:50 to 11/15 09:55 Missing data 11/21 14:05 to 11/21 14:10 Missing data 11/25 09:25 to 11/25 09:30 Missing data 11/27 09:45 to 11/27 09:50
23	S. Riverton @ Magnolia	38-1	None				Missing data 11/20 10:15 to 11/20 10:20
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		1		378,272	100	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

November 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
11/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/04/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/05/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/06/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/07/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/08/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/09/19	0.03	0.03	-	0.02	0.04	0.03	0.05	0.02	0.03	0.03	0.03	0.02	0.02	0.04	-	-	0.06	-	-	0.03
11/10/19	0.01	-	-	-	-	-	-	-	-	0.01	-	-	0.02	-	-	-	-	-	-	T
11/11/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/12/19	0.06	0.06	-	0.03	0.04	0.02	0.04	0.02	0.04	0.04	0.03	0.04	0.02	0.04	T	-	0.05	T	-	0.04
11/13/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08	-	-	T	-	-	T
11/15/19	0.09	0.09	0.06	0.07	0.06	0.06	0.12	0.06	0.08	0.07	0.05	0.06	0.06	T	-	-	0.11	-	-	0.08
11/16/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38	-	-	0.04	-	-	-
11/17/19	0.40	0.40	0.37	0.38	0.38	0.37	0.60	0.39	0.39	0.37	0.44	0.38	0.36	0.01	-	-	0.35	-	-	0.38
11/18/19	-	-	-	-	-	-	-	-	-	0.01	-	-	-	0.09	-	-	0.02	-	-	T
11/19/19	0.15	0.11	0.08	0.09	0.08	0.11	0.14	0.12	0.11	0.09	0.18	0.13	0.14	-	-	-	0.10	-	-	0.16
11/20/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/21/19	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/22/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
11/23/19	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/24/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/25/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/26/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	0.60	-	0.01	0.60	M	T
11/27/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	1.00	T	T	T	T
11/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	T	T	T	T
11/29/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
11/30/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Total	0.76	0.69	0.51M	0.59	0.60	0.59	0.95E	0.61	0.65	0.62	0.73	0.63	0.62	0.68	0.60	-	0.74	0.60	-	0.69

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

November 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe_Alb	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field

CITY OF SPOKANE, WASHINGTON

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
December 2019**

January 20, 2020
CSOMonthly2019-12.docx

December 2019

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
1	AL Parkway Storage (West)	2	None				
2	NW Blvd @ Kiernan	6	None				Missing data 12/04 08:15 to 12/04 08:20 Missing data 12/10 09:25 to 12/10 09:30 Missing data 12/20 08:30 to 12/20 08:35
3	Columbia @ Downriver	7	None				
4	Nettleton @ York/Buckeye	10	None				
5	Nora @ Pettet	12	None				
6	Sherwood @ Summit	14	None				Missing data 12/19 13:20 to 12/19 13:25
7	Nettleton @ Ohio	15	None				
8	A @ Linton	16	None				
9	7th @ Inland Empire	19	None				
11	Main @ Oak	22B	None				Missing data 12/03 14:05 to 12/03 14:10 Missing data 12/12 08:35 to 12/12 08:40 Missing data 12/17 10:20 to 12/17 10:25

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

December 2019

Line No.	Regulator Location	CSO No.	Freq.	Date of event ¹	Estimated Total Flow (Gallons) ²	Event Duration (Min. of Overflow)	Comments
12	Cedar @ Summit	23-1	None				Missing data 12/04 10:00 to 12/04 10:05 Missing data 12/10 08:10 to 12/10 08:15 Missing data 12/16 06:20 to 12/16 06:25 Missing data 12/17 08:25 to 12/17 08:30 Missing data 12/22 04:30 to 12/22 04:35 Missing data 12/25 03:35 to 12/25 03:40 Missing data 12/28 02:40 to 12/28 02:45 Missing data 12/31 01:45 to 12/31 01:50
15	1st @ Adams	24-1	None				
16	Cedar @ Main	25	None				Missing data 12/06 10:45 to 12/06 10:50 Missing data 12/12 08:25 to 12/12 08:30 Missing data 12/24 09:20 to 12/24 09:25 Missing data 12/27 13:35 to 12/27 13:40
17	Riverside @ Lincoln	26	3	Total	637,792	400	Missing data 12/16 10:40 to 12/16 10:45
				12/07	40,243	35	
				12/12	474,388	225	
				12/19	123,161	140	
19	Arthur @ 3rd	33C	None				
20	Liberty Park (west end)	33-1	None				
21	Sprague Ave @ Sprague Wy	33-2	None				
22	Riverside @ Napa/Crestline	34	None				Missing data 12/09 09:35 to 12/09 09:40 Missing data 12/16 14:45 to 12/16 14:50 Missing data 12/23 09:45 to 12/23 10:25 Missing data 12/27 09:40 to 12/27 09:45
23	S. Riverton @ Magnolia	38-1	None				
24	Rebecca @ Upriver	41	None				
25	Riverton @ Surro	42	None				
26	RPWRF CSO-Related Bypass	N/A	None				Permit Section S13.H
	Monthly Total		3		637,792	400	No Dry Weather Overflows No RPWRF CSO-Related Bypasses

December 2019

Table 2 – Rainfall Summary³

	343	344	Shadle	Hartson	CityHall	Joe_Alb	RkwdVsta	Station8	W_Drive	Nora&Pet	Lincoln	Northeast	Crest&Hoff	GEG			NWS			SFF
Date	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Rain	Snow	Dpth	Rain	Snow	Dpth	Rain
12/01/19	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.10	-	0.03	0.50	-	T
12/02/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	T
12/03/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	T
12/04/19	0.02	0.02	0.01	-	-	-	-	-	-	-	0.03	0.01	-	0.02	-	-	T	-	-	0.03
12/05/19	-	-	0.01	0.01	-	-	-	0.02	0.01	0.03	-	0.02	0.03	T	-	-	T	-	-	0.03
12/06/19	0.01	-	0.01	-	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-
12/07/19	0.28	0.28	0.33	0.22	0.32	0.30	0.41	0.23	0.34	0.36	0.39	0.35	0.16	0.31	-	-	0.32	-	-	0.30
12/08/19	-	-	-	-	-	-	-	-	-	-	0.01	-	-	T	-	-	T	-	-	-
12/09/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
12/10/19	-	-	-	0.01	-	0.01	0.03	0.01	-	-	0.01	-	-	0.02	0.30	-	0.02	0.40	-	0.03
12/11/19	-	0.05	0.02	0.21	0.28	0.14	0.32	0.24	0.29	0.01	0.18	0.03	-	0.25	1.90	2.00	0.11	1.70	2.00	0.25
12/12/19	0.44	0.56	0.69	0.49	0.49	0.47	0.73	0.45	0.55	0.65	0.58	0.72	0.38	0.41	-	1.00	M	-	-	0.48
12/13/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	-	-	-	-
12/14/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	T	T	T	-	-
12/15/19	-	-	-	0.01	0.01	-	0.02	0.01	0.02	-	0.02	-	-	0.05	1.00	1.00	0.03	0.40	-	0.01
12/16/19	0.03	0.01	-	-	-	-	-	-	-	0.02	-	0.02	0.01	T	T	1.00	T	T	-	-
12/17/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-
12/18/19	-	0.01	-	-	-	-	-	-	P	-	-	-	-	-	-	T	-	-	-	-
12/19/19	0.17	0.05	0.11	0.42	0.53	0.41	0.73	0.34	0.57	0.46	0.41	0.26	0.03	0.51	2.70	1.00	0.52	2.70	1.00	0.28
12/20/19	0.09	0.08	0.05	0.05	0.04	0.04	0.10	0.04	0.08	0.05	0.04	0.03	0.02	0.07	-	T	0.02	-	-	0.05
12/21/19	-	-	-	-	0.01	0.02	-	-	0.02	-	-	-	-	0.01	-	-	0.02	-	-	0.01
12/22/19	0.02	0.03	0.02	0.01	0.02	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.02	-	-	0.04	-	-	0.03
12/23/19	-	-	-	-	-	-	-	-	P	-	-	-	-	T	-	-	0.03	-	-	-
12/24/19	0.04	0.03	-	0.05	0.01	-	0.02	0.01	-	-	0.01	0.01	-	T	T	-	0.02	0.10	-	0.03
12/25/19	0.05	0.01	-	0.02	-	-	-	0.03	-	-	0.08	0.14	0.07	T	T	-	T	T	-	0.10
12/26/19	-	-	-	-	-	-	-	-	P	-	-	-	0.02	T	T	-	T	T	-	-
12/27/19	-	-	-	-	-	-	0.01	-	-	-	0.02	-	-	0.03	0.80	-	0.03	0.50	1.00	0.02
12/28/19	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	1.00	T	T	1.00	T
12/29/19	0.03	0.01	-	-	-	-	-	-	-	-	-	0.03	-	T	T	T	T	T	-	-
12/30/19	-	-	-	0.01	0.02	-	-	-	0.01	-	-	-	-	0.02	0.30	T	0.06	0.60	1.00	0.01
12/31/19	0.07	0.42	0.39	0.41	0.48	0.44	0.57	0.44	0.55	0.49	0.52	0.39	0.41	0.41	3.40	1.00	0.49	3.80	-	0.41
Total	1.25	1.56	1.64	1.92	2.21	1.84	2.97E	1.83	2.46P	2.10	2.32	2.06	1.14	2.14	10.50	-	1.74M	10.70	-	2.07

E – Erroneous data

M – Missing Data

P – Partial Missing data

T – Trace of rain/snow

X – Out of Service

³ Some rain gauges are heated. Consequently, they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.

December 2019

Table 3 – Rain Gauges

343	23 rd & Ray
344	Division & Manito
Shadle	Shadle Water Tower (was 345)
Hartson	Ray & Hartson (was 346)
CityHall	City Hall (was 347)
Joe Albi	Joe Albi Stadium
RkwdVsta	Rockwood Vista
Station8	Fire Station 8, Rebecca & Mission
W_Drive	West Drive Reservoir
Nora&Pet	Nora & Pettet
Lincoln	Lincoln Rd Lift Station
Northeast	Northeast Lift Station
Crest&Hoff	Crestline & Hoffman
GEG	Spokane Airport
NWS	National Weather Service – Spokane
SFF	Spokane Felts Field